US006285286B1

(12) **United States Patent**
Tyrén et al.

(10) **Patent No.: US 6,285,286 B1**
(45) **Date of Patent: Sep. 4, 2001**

(54) ANTI-THEFT DEVICE WITH A THERMALLY CONTROLLABLE LOCKING MECHANISM

(75) Inventors: **Carl Tyrén**, Saint Roman (MC); **Christian Quinones**, Solliés-Pont (FR)

(73) Assignee: **RSO Corporation N.V.**, Curacao (NL)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **09/509,267**

(22) PCT Filed: **Sep. 29, 1998**

(86) PCT No.: **PCT/SE98/01727**

§ 371 Date: **May 24, 2000**

§ 102(e) Date: **May 24, 2000**

(87) PCT Pub. No.: **WO99/18312**

PCT Pub. Date: **Apr. 15, 1999**

(30) **Foreign Application Priority Data**

Oct. 2, 1997 (SE) 9703623

(51) **Int. Cl.**[7] **G08B 13/14**
(52) **U.S. Cl.** **340/572.9**; 340/426; 340/572.8
(58) **Field of Search** ..... 340/572.1, 572.8, 340/572.9, 542, 426; 70/57.1, 282, DIG. 10; 292/DIG. 66

(56) **References Cited**

U.S. PATENT DOCUMENTS

3,806,910	*	4/1974	Keifer et al.	340/572.9
4,072,867		2/1978	Goodlaxson	307/118
4,380,097		4/1983	Keifer	340/572.9
4,575,706	*	3/1986	Heidman, Jr.	340/426
4,617,448		10/1986	Goldowsky	219/200
5,077,872		1/1992	Guthammer	24/704.1
5,211,183		5/1993	Wilson	600/585
5,905,446	*	5/1999	Benore et al.	340/542

FOREIGN PATENT DOCUMENTS

3820877	6/1988	(DE) .
G 90 01 907	2/1990	(DE) .
0 212 061	4/1986	(EP) .

OTHER PUBLICATIONS

International Search Report for PCT/SE98/01727 dated Feb. 15, 1999.

* cited by examiner

Primary Examiner—Van T. Trieu
(74) *Attorney, Agent, or Firm*—Merchant & Gould P.C.

(57) **ABSTRACT**

An anti-theft device **(10)** for deterring theft of a protected article has first and second housing elements **(12,16)** and a locking mechanism **(20)** for securing a male portion **(17)** of the second housing element **(16)** to a female portion of the first housing element **(12)**. The locking mechanism releases the male portion from the female portion, when actuated by an unlocking device operated by an authorized person. A thermally controllable element **(36,42)** assumes a first position during normal temperatures, wherein the locking mechanism **(20)** is kept in a locked state, and a second position when heated to temperatures above a predetermined limit, wherein the locking mechanism is caused to release the male portion **(17)** from the female portion of the first and second housing elements **(12,16)**.

19 Claims, 3 Drawing Sheets

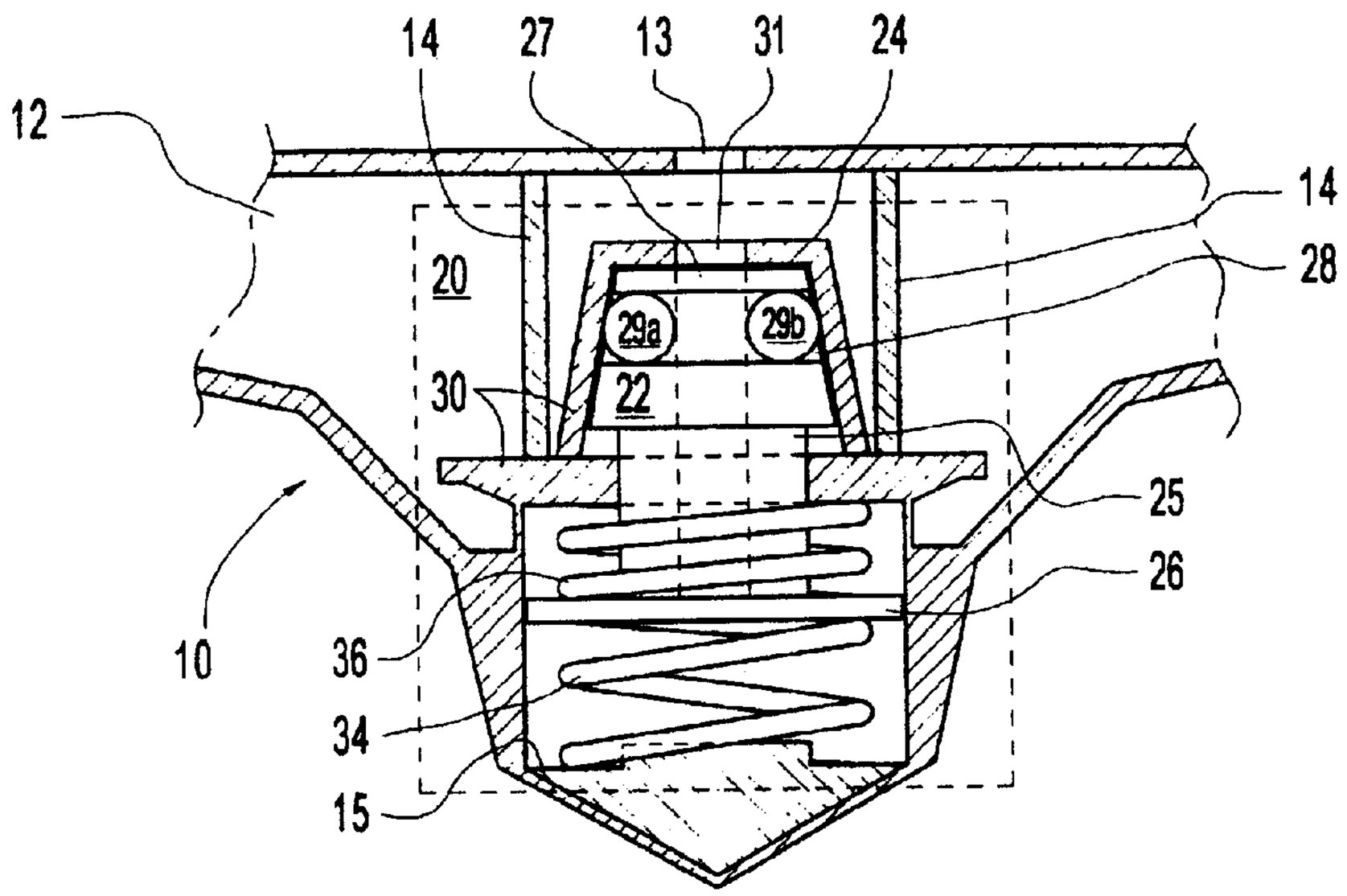


Fig. 1

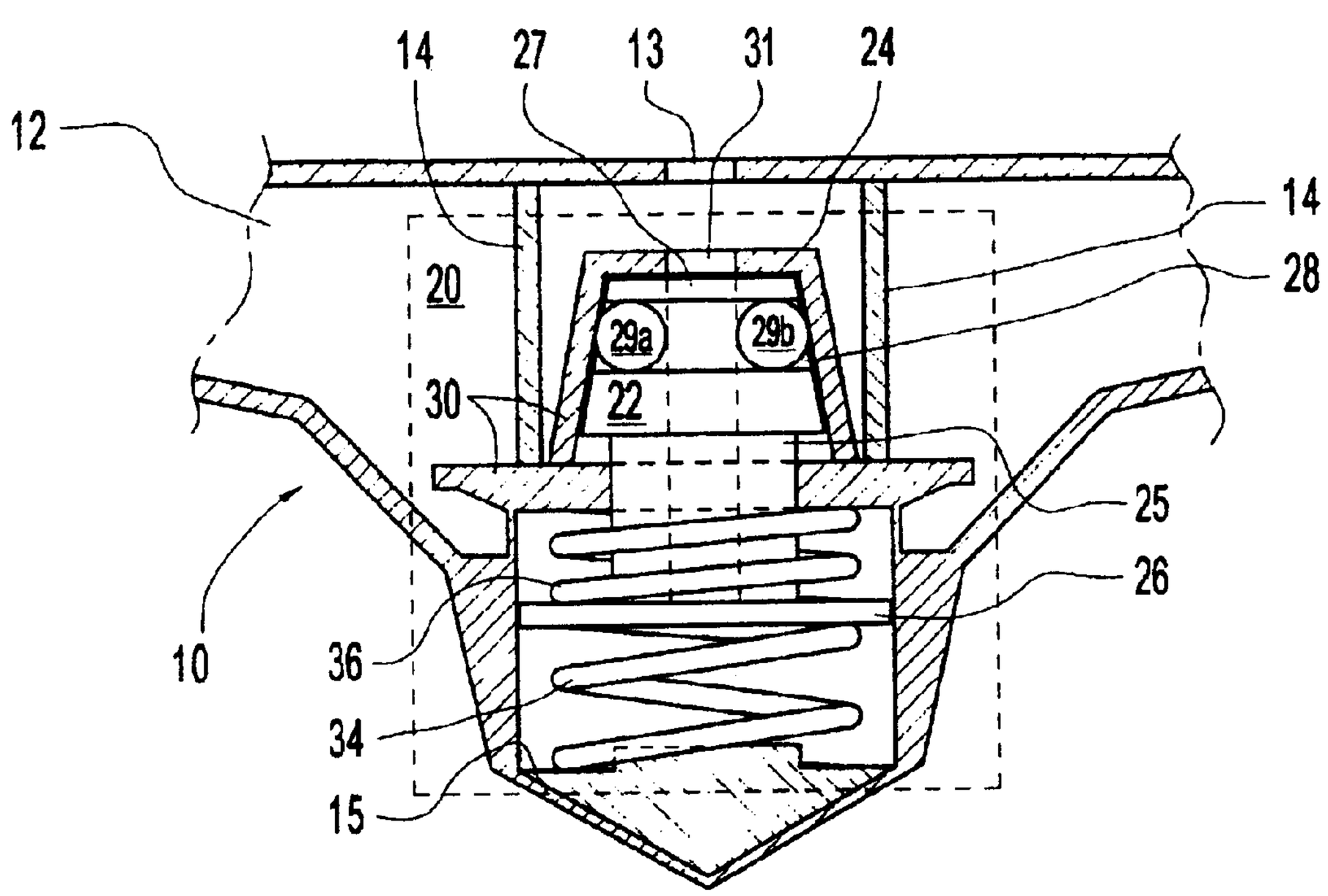


Fig. 2

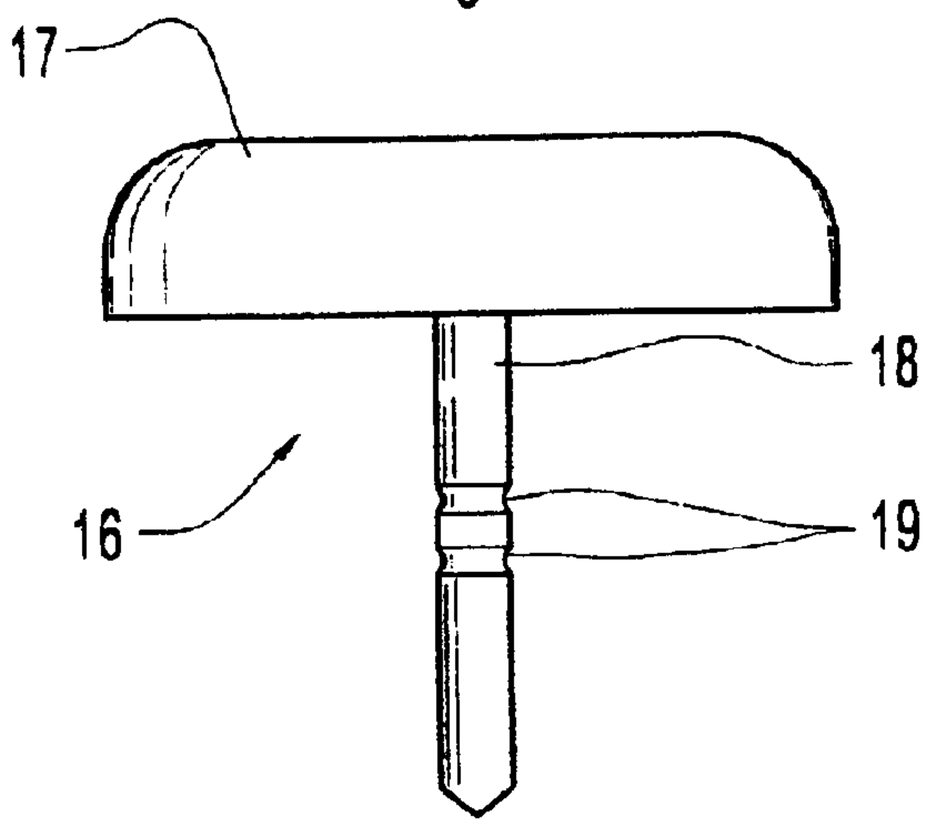


Fig. 3

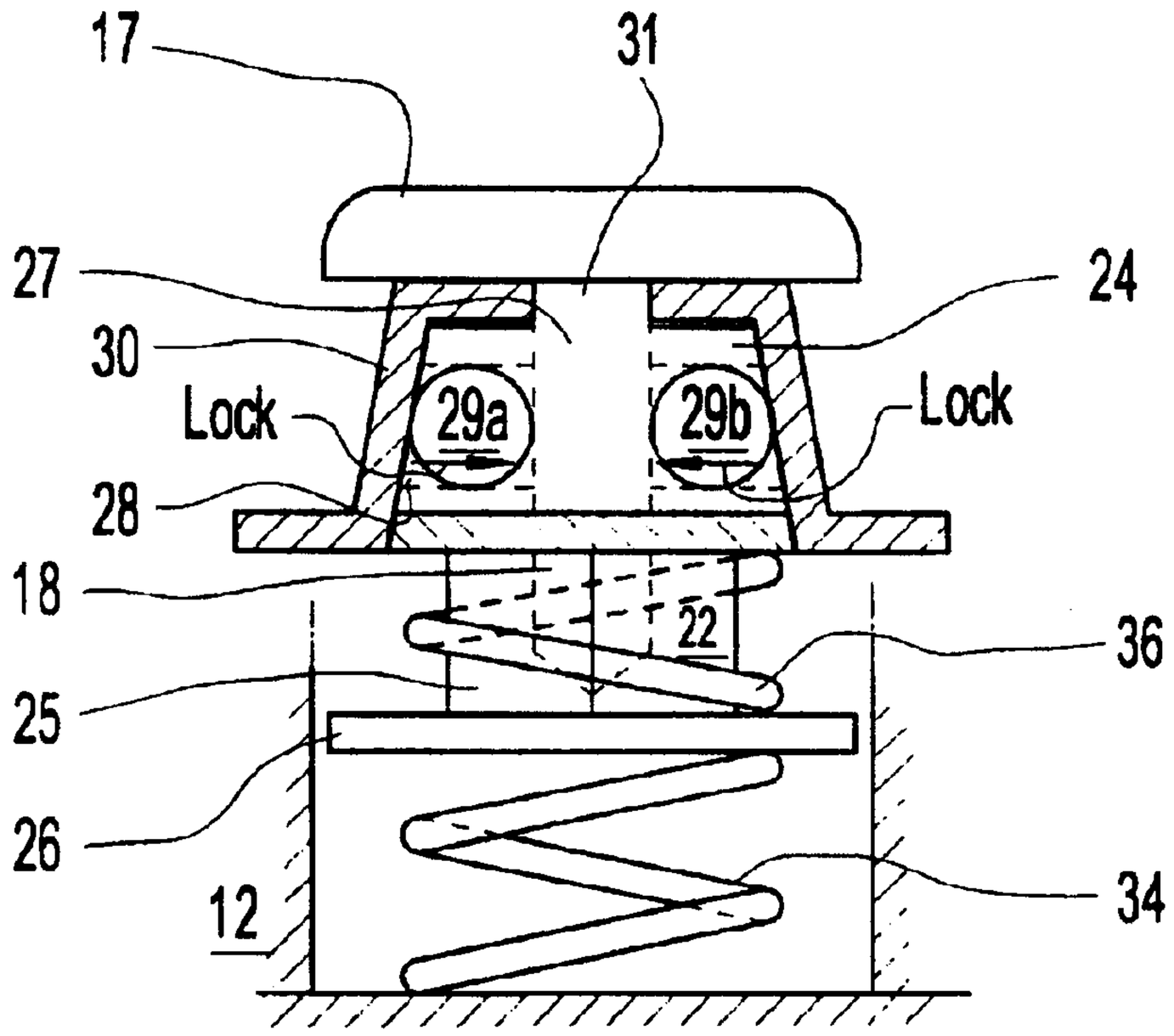

17
31
27
24
30
Lock
29a
29b
Lock
28
18
22
36
25
26
12
34

Fig. 4

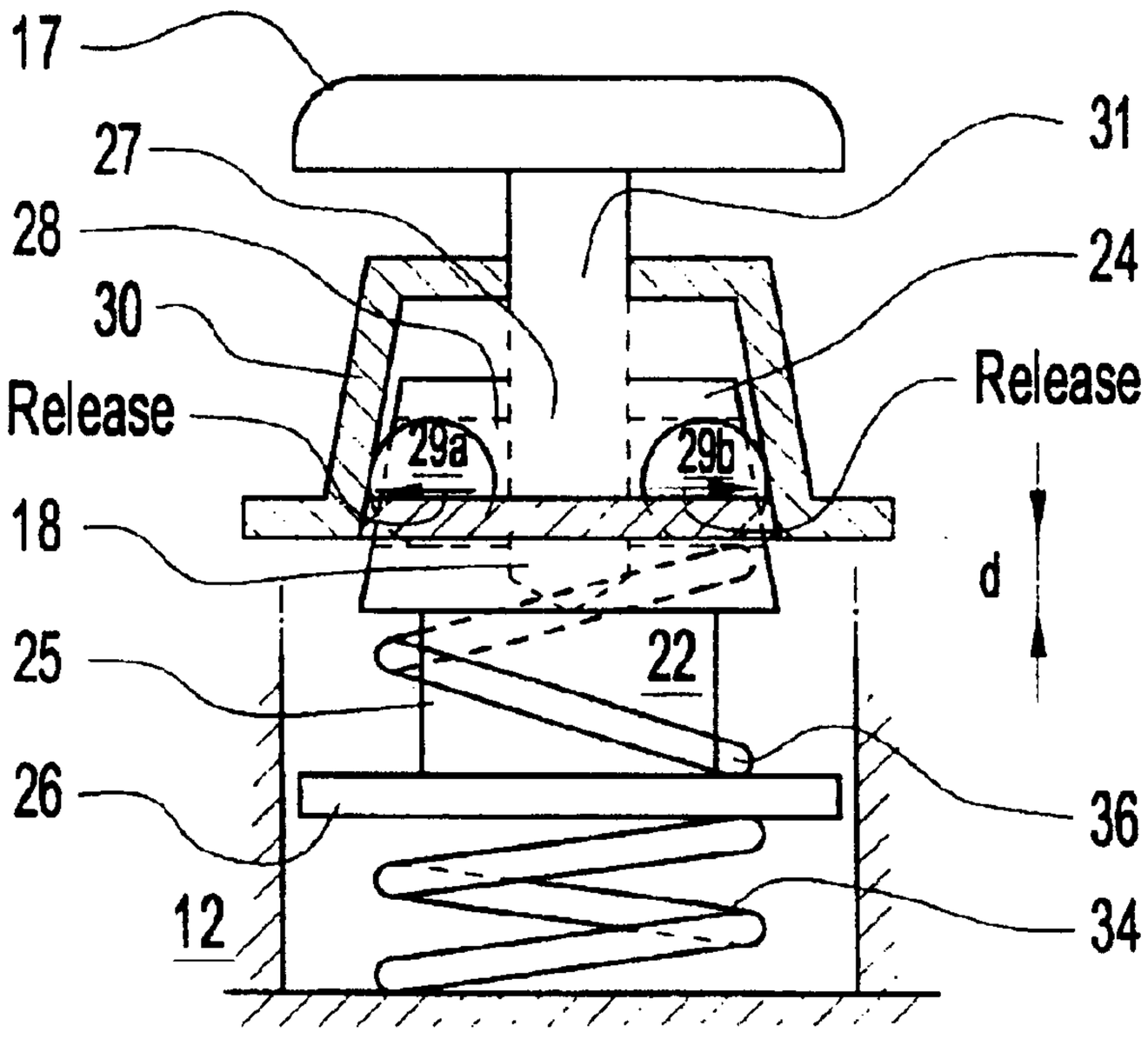

17
27
31
28
24
30
Release
29a
29b
Release
18
d
25
22
26
36
12
34

Fig. 5

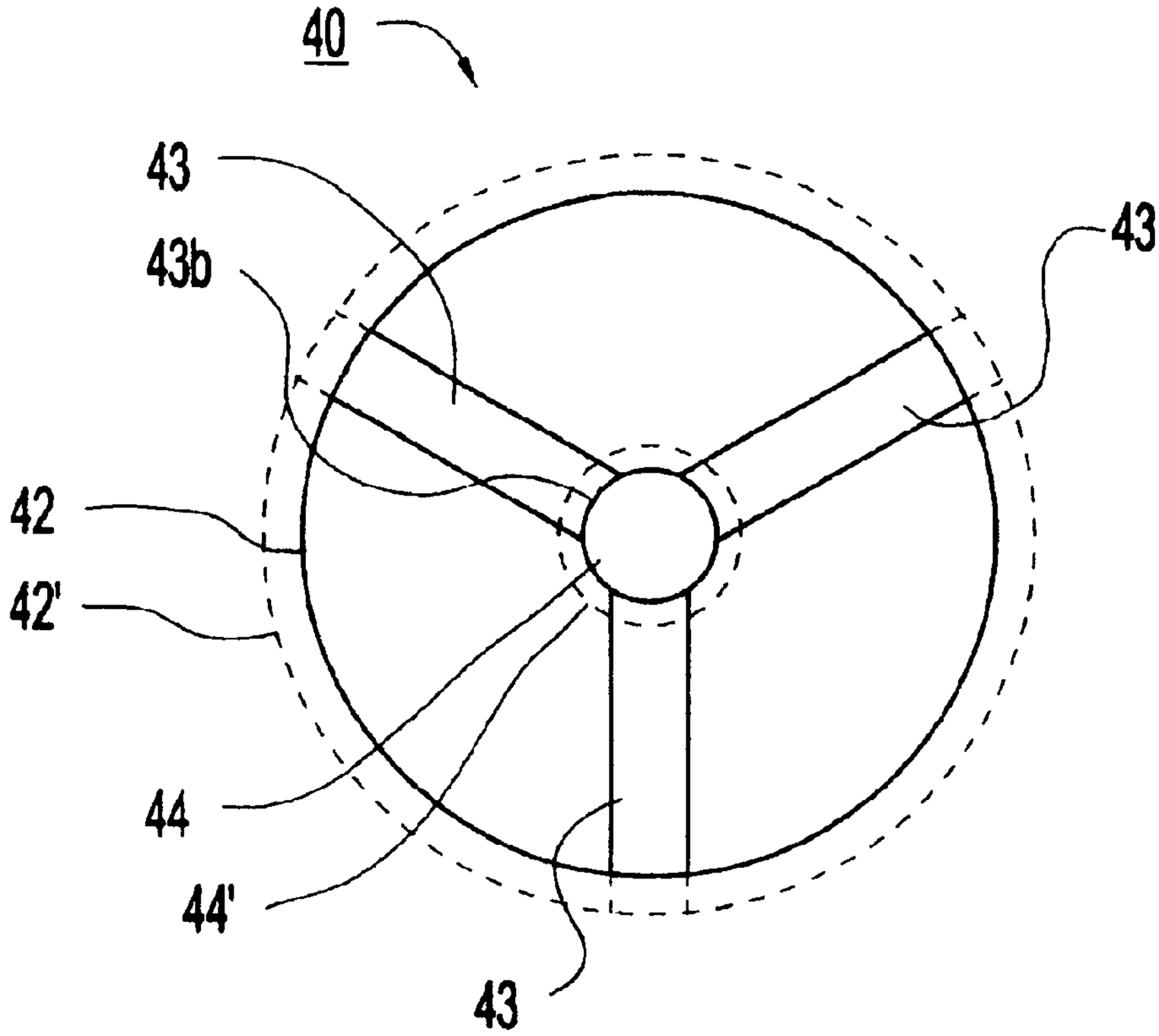
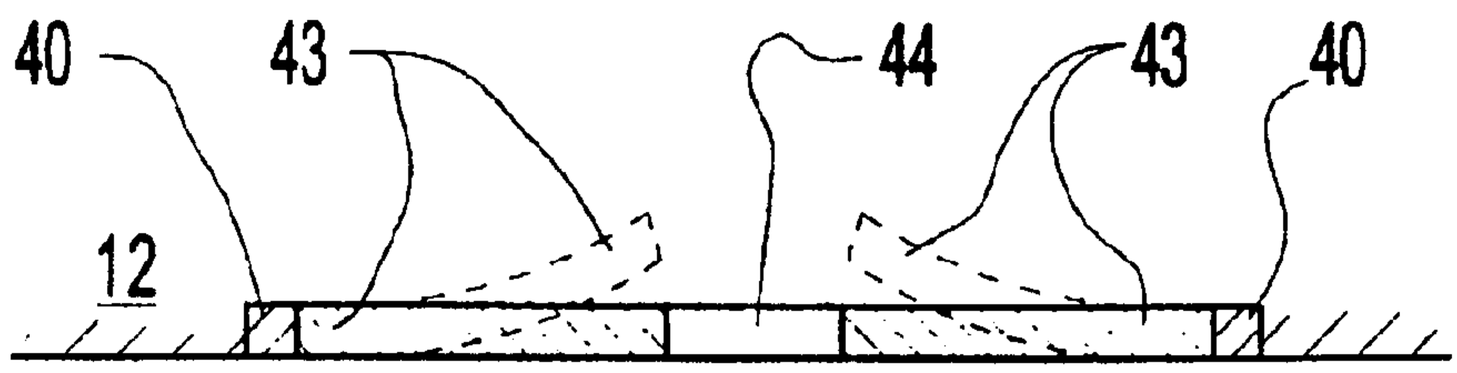
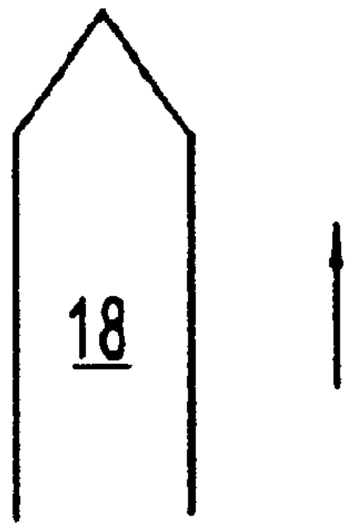


Fig. 6





ANTI-THEFT DEVICE WITH A THERMALLY CONTROLLABLE LOCKING MECHANISM

TECHNICAL FIELD

The present invention relates to an anti-theft device for deterring theft of a protected article, the device comprising first and second housing elements and a locking mechanism for securing a male portion of the second housing element to a female portion of the first housing element, the locking mechanism being arranged to release the male portion from the female portion, when actuated by an unlocking device operated by an authorized person.

DESCRIPTION OF THE PRIOR ART

Anti-theft devices of the kind described above are used for deterring theft of protected articles or goods, especially in shops or stores. It is of particular interest for the owner of a shop to protect attractive and easily removable articles, such as clothes, handbags, shoes, etc, by attaching an anti-theft device to each article. The attachment is made in such a manner, that the anti-theft device can only be removed from the protected article by means of a dedicated unlocking device, which only authorized persons have access to. The anti-theft device is often provided with at least one glass ampoule containing a discoloring or ill-smelling fluid. Furthermore, the anti-theft device is designed in a way, so that the glass ampoule will break and start leaking, if an unauthorized person, such as a thief, tampers with the anti-theft device in an attempt to remove the device from the protected article. Hence, since the broken glass ampoule will immediately stain or contaminate the article and make it useless for all practical purposes, a potential thief is discouraged from such a tampering attempt.

As an alternative to the fluid-containing ampoule(s), the anti-theft device may be provided with sensor or transponder means detectable by an electronic article surveillance system (EAS). The anti-theft device may for instance be provided with a thin metal strip of an amorphous magnetic alloy. The magnetic properties of the metal strip are controllable by means of an alternating magnetic field generated by external means, such as inductive detection arcs. Such transponders or sensors are for instance disclosed in U.S. Pat. No. 5,469,140, U.S. Pat. No. 5,414,412, U.S. Pat. No. 5,406,262 and WO97/29463.

U.S. Pat. No. 5,275,122 discloses an anti-theft device as described above, which is intended to be attached to an attractive article for the protection thereof. The device comprises a first element with a connecting pin to be inserted through the article, and a second element, which is intended for attachment to the connecting pin. The first element includes a fragile ampoule containing a staining liquid, said ampoule breaking upon manipulation of the anti-theft device. The first element acts as a device base element, while the second element acts as a locking element or head, which is mounted on the pin of the base element so as to firmly secure the protected article between the first and the second elements. For this purpose the head comprises a locking device, which is designed so that the head may easily be moved along the axial direction of the pin in one direction only, namely towards the base element, whereas any attempt to move the head in the opposite direction, i.e. away from the base element, will cause the head to be immediately locked to the pin.

The locking mechanism in the head includes a number of small metallic retaining balls, which are disposed in internal grooves in the head, in a way so that the retaining balls are

firmly clamped against the pin and the bottom of the grooves, when the head is drawn outwards, while allowing the head to be moved inwardly along the pin. Hence, the locking mechanism of the anti-theft device acts as a one-way coupling, which may be rendered inoperative (i.e. to release the head from the pin) only by means of an appropriate unlocking device, said unlocking device only being available to authorized personnel.

U.S. Pat. No. 4,012,813 relates to a fastening device for securing articles together, the device including releasably connected male and female components. The male component comprises a pin, whereas the female component comprises a magnetic retaining insert positioned in a housing for releasably clamping the pin. When joined, the pin cannot be separated from the retainer, unless a special tool is used. Since the insert is of magnetic material, an actuating tool including an electromagnet may be used for actuating the insert to permit removal of the pin. The fastening device is intended to be used in an anti-theft tag, comprising an electrical circuit, which activates an alarm, if the tag has not been properly removed when a checkout point is passed. Similar anti-theft locking devices are disclosed in U.S. Pat. No. 4,221,025, U.S. Pat. No. 4,903,383, U.S. Pat. No. 5,054,172, U.S. Pat. No. 5,031,287 and U.S. Pat. No. 4,483,049.

U.S. Pat. No. 5,140,836 discloses a clamp for use as a theft deterrent device, comprising a U-shaped member having first and second legs including a shelf disposed on the inside of each leg. Furthermore, a clamp housing has a pair of longitudinal channels for receiving the legs of the U-shaped member as well as means provided with a row of teeth for engaging the shelves on the U-shaped member, so as to prevent removal of the U-shaped member from the longitudinal channels. The housing comprises a magnetically attractive element, which when attracted by an external magnetic field is movable to such a position, in which the teeth are disengaged from the shelves, so that the U-shaped member may be removed from the housing. A similar magnetically releasable clamp is disclosed in U.S. Pat. No. 5,337,459, where an U-shaped member is engaged by means of retaining balls rather than teeth.

A common drawback of the previously known anti-theft devices described above is that the locking mechanism thereof (i.e. the one-way coupling which allows the male portion—pin or U-shaped member—to be inserted into the female portion of the device, while preventing the male portion from being separated from the female portion, unless actuated by the unlocking device) may be actuated by other means than the intended unlocking device. For instance, the knowledge about the magnetically releasable locking mechanism inside conventional anti-theft devices is most likely well-spread among criminal individuals, such as shop-lifters. Hence, a shop-lifter may easily bring his or her own permanent magnet, or possibly electromagnet, into the shop and use the magnet for releasing the male portion from the female portion, so as to remove the anti-theft device from the desired article. Then, nothing stops the thief from stealing the article.

SUMMARY OF THE INVENTION

An object of the present invention is to prevent unauthorized people from removing the anti-theft devices from protected articles by using their own "home-made" unlocking device, such as a permanent magnet or, possibly, a battery-powered electromagnet.

The object of the invention is achieved for anti-theft devices, comprising first and second housing elements and

a locking mechanism for securing a male portion (e.g. a pin) of the second housing element to a female portion (comprising e.g. spring biased retaining balls) of the first housing element, the locking mechanism being arranged to release the male portion from the female portion, when actuated by an unlocking device operated by an authorized person, by providing the locking mechanism with a thermally controllable element, which is arranged to assume a first position during normal temperatures, wherein the locking mechanism is kept in a locked state, and a second position when heated to temperatures above a predetermined limit, wherein the locking mechanism is caused to release the male portion from the female portion of the first and second housing elements.

Other objects, aspects and features of the present invention are defined by the subsequent dependent claims.

BRIEF DESCRIPTION OF THE DRAWINGS

Preferred and alternative embodiments of the present invention will now be described in more detail, reference being made to the accompanying drawings, in which

FIG. **1** is a schematic sectional view of the locking mechanism in an anti-theft device according to a preferred embodiment,

FIG. **2** is a schematic sectional view of a male portion of the anti-theft device according to the preferred embodiment,

FIG. **3** is a schematic and simplified view of vital portions of the locking mechanism in a normal or locked state,

FIG. **4** is a schematic and simplified view of vital parts of the locking mechanism in a state of release,

FIG. **5** is a schematic topview of a locking mechanism according to an alternative embodiment, and

FIG. **6** is a schematic sideview of the embodiment of FIG. **5**.

DETAILED DISCLOSURE OF THE INVENTION

FIG. **1** discloses, in a schematic way, the locking mechanism in an anti-theft device **10** according to a preferred embodiment of the present invention. The anti-theft device **10** comprises a first housing element **12**, which acts as a base element for the anti-theft device and which, apart from the elements disclosed in the drawing, may contain conventional theft-deterrent means known from the prior art, such as glass ampoules containing a discoloring or ill-smelling fluid or transponder means for responding to an interrogation signal, as will be described in more detail later.

Comprised in the first housing element **12** is a locking mechanism **20**, which is contained within a dashed frame in FIG. **1**. The locking mechanism **20** comprises a spring biased piston **22**, which is movable in the axial direction (i.e. in the vertical direction in FIG. **1**) within certain limits, as will be described below. The piston **22** has an upper conical portion **24**, a lower base portion **26** and an cylindrical intermediate portion **25** between the upper portion **24** and the base portion **26**. Furthermore, the piston **22** is provided with a coaxial bore **27** extending along the axial direction of the piston **22** through the conical portion **24**, the intermediate portion **25** and the base portion **26**, as well as a transversal bore **28** extending through the upper conical portion **24** in a direction perpendicular to the axial direction of the piston **22**. The transversal bore **28** is arranged to receive two metallic retaining balls **29***a* and **29***b*, the diameter of the bore **28** being only slightly larger than the diameter of the retaining balls **29***a* and **29***b*, so that the retaining balls will fit precisely inside the transversal bore **28**.

Furthermore, the locking mechanism **20** comprises a conical metal sleeve **30**, which includes an opening **31** aligned with the coaxial bore **27** inside the piston **22**. The conical sleeve **30** is firmly mounted inside the first housing element **12** by way of a supporting structure **14**.

A biasing spring **34** is arranged in a cavity formed between the bottom of the base portion **26** of the piston **22** and the bottom interior surface **15** of the first housing element **12**. The biasing spring **34** is preferably made of metal, has a conventional design and has the purpose of biasing the piston **22** in a direction towards the upper portion of the conical sleeve **30**. When the upper conical portion **24** of the piston **22** is biased towards the upper interior surface of the conical sleeve **30**, the retaining balls **29***a* and **29***b* contained inside the transversal bore **28** make contact with the lateral interior surfaces of the conical sleeve **30**, thereby forcing the retaining balls inwardly towards each other, as will be described in more detail with reference to FIGS. **3** and **4**.

The first housing element **12** is arranged to receive a second housing element **16**, which is schematically disclosed in FIG. **2**, through an opening **13** in the upper portion of the first housing element **12**, through the opening **31** in the upper portion of the conical sleeve **30**, and through the coaxial bore **27** inside the piston **22**. The second housing element **16** has the form of a head **17**, to which a pin **18** is mounted. The head **17** may, together with the first housing element **12**, be made from plastics or any other suitable material, while the pin **18** is preferably made from metal. The pin **18** comprises a plurality of notches **19** for engagement with the retaining balls **29***a* and **29***b*, as will be described below.

A releasing spring **36** is arranged between the upper surface of the base portion **26** of the piston **22** and the bottom surface of the conical sleeve **30**. The releasing, spring **36** is arranged to assume a first position during normal operating temperatures, such as temperatures below a predetermined threshold limit, which in accordance with the findings below may be set to a sufficiently high value, preferably exceeding 100° C. When the releasing spring **36** assumes its first position during normal operation, it does not exert any considerable force on the base portion **26** of the piston **22**. Hence, at normal temperatures, the spring force of the biasing spring **34**, which acts in a direction towards the upper portion of the conical sleeve **30** (i.e. upwards in FIG. **1**), is much stronger than the spring force of the spring **36**, which acts in an opposite direction towards the bottom **15** of the first housing element **12** (i.e. downwards in FIG. **1**).

The operation when the anti-theft device **10** is to be applied onto an article is as follows. The pin **18** on the second housing element **16** is run through the article to be protected, for instance through a button hole or directly through the fabrics of for instance a piece of clothing. The pin **18** is essentially needle-shaped, which makes it easy for the tip of the pin **18** to perforate the article of protection without causing any particular damage to the latter. Then the pin **18**, acting as a male connecting element, is inserted into the female portion of the first housing element **12** (i.e. the openings **13** and **31** as well as the coaxial bore **27**). When the pin **18** contacts the surfaces of the retaining balls **29***a* and **29***b*, the latter are urged outwardly, until they reach contact with the interior lateral surfaces of the conical sleeve **30**. Since the piston **22** is movably arranged in the axial direction thanks to the compressible biasing spring **34**, the retaining balls **29***a* and **29***b* are given more space to move outwardly towards the lateral sides of the conical sleeve **30**, when the piston **22** is pushed down by the entering pin **18**.

Hence, the pin **18** may be fully inserted into the female portion of the first housing element **12**.

Once the second housing element **16** has been attached to the first housing element **12**, i.e. the pin **18** has been fully inserted into the female portion of the first housing element **12**, the first and the second housing elements are prevented from being separated from each other. If an attempt is made to pull back the head **17**, so as to remove the pin **18** from the interior of the first housing element **12**, the piston **22** is forced upwardly due to the spring force exerted by the biasing spring **34**. Since the sleeve **30** and the upper portion **24** of the piston **22** are both given a conical shape, the free space available for the balls **29***a* and **29***b* to move in is reduced, as the piston **22** moves upwards towards the upper interior surface of the sleeve **30**. As a consequence, the distance between the retaining balls **29***a* and **29***b* are not big enough for releasing the pin **18**. On the contrary, the retaining balls **29***a*–**29***b* will firmly engage with the notches **19** in the pin **18**, thereby securing the pin **18** inside the first housing element **12** and preventing the detachment of the second housing element **16** from the first housing element **12** and also preventing removal of the anti-theft device **10** from the protected article.

The normal operating situation is further illustrated in FIG. **3**, showing the pin **18** of the head **17** when fully inserted into the female portion of the first housing element **12**, i.e. the opening **31** in the conical sleeve **30** as well as the coaxial bore **27** through the piston **22**. As the piston **22** is pushed towards the top of the conical sleeve **30**, the retaining balls **29***a* and **29***b* are pushed towards each other against the pin **18**. Thus, if a potential thief tries to pull the head **17** and the pin **18** out of the coaxial bore **27**, the small distance between the retaining balls **29***a* and **29***b* will prevent such removal. As a matter of fact, the pressure with which the retaining balls **29***a* and **29***b* engage the pin **18** increases as the strength with which the head **17** is pulled increases. Thus, the retaining balls **29***a* and **29***b* firmly secure the pin **18**, in particular the notched portions **19**.

The anti-theft device provides a way for an authorized person to release the male portion (i.e. the pin **18**) from the female portion (i.e. the coaxial bore **27**, the retaining balls **29***a*–**29***b* and the conical sleeve **30**) of the locking mechanism, without using any conventional unlocking means. Instead, the authorized person, e.g. a shop assistant at a cashier desk, will actuate an external device (not disclosed herein) for supplying thermal energy to the releasing spring **36**. According to the preferred embodiment of the invention the releasing spring **36** is made from a metal, which exhibits a so called shape-memory effect (SME). Furthermore, according to the preferred embodiment the aforesaid external heating device is arranged to generate a high-frequency alternating magnetic field exposing the anti-theft device **10**, wherein an electric current is induced in the releasing spring **36**. As a consequence, the spring **36** is heated to a high temperature well above a predetermined limit, at which the shape-memory metal spring is caused to switch from its first or normal shape according to FIGS. **1** and **3** to a second shape according to FIG. **4**. Compared to the normal compressed shape the second shape is more extended (since the length of the shape-memory spring **36** is considerably increased in the second position), wherein the spring force of the spring **36** is increased. Thus, the releasing spring **36** pushes the lower portion **26** of the piston **22** in a direction away from the top of the conical sleeve **30**, thereby compressing the biasing spring **34**.

As a result the upper conical portion **24** of the piston **22** is moved a distance d away from the top of the sleeve **30**, thereby allowing more space for the retaining balls **29***a*–**29***b*, which then are free to move outwardly. The engagement between the retaining balls **29***a*–*b* and the pin **18** thereby ceases, and the second housing element **16** (i.e. the head **17** and the pin **18**) may be removed from the female portion of the first housing element **12**. The authorized person may then remove the protected article from the pin **18**, for instance in response to having received a sufficient amount of money from a customer as payment for the article.

In the preferred embodiment the releasing spring **36** has a length of about 2 mm in its normal state. When the spring is inductively heated to temperatures above 65° C., the length of the spring is increased to about 3–4 mm. The spring is made of a nickel-titanium alloy, such as Nitinol, which is commercially available from Raychem Inc. It has no magnetic properties and may hence not be manipulated by a permanent magnet or a home-made electromagnet of the kind, with which the prior art anti-theft devices described above may be manipulated. To form a closed current loop for the induced electric current, an electric conductor not shown in the drawings is connected between the respective ends of the spring **36**.

The heating device used for inductively heating the releasing spring **36** may be a conventional inductive oven known per se. An importance advantage of using an inductive heating device is that no elements apart from the inductive releasing spring **36** will be heated. In particular, this means that there is no risk of damaging or burning the article, to which the anti-theft device **10** is attached.

The knowledge about the internal operating principle of the locking device may, undesiredly, become public knowledge among criminal individuals in the future. To avoid unauthorized people from unlocking the anti-theft device by supplying heat from their own source of heat, for instance by pouring very hot water from a thermos jug onto the anti-theft device, the releasing spring **36** may be designed in such a way, that the predetermined temperature limit for switching between the first and the second shapes is well above the boiling point of water, i.e. 100° C. As an alternative, the heating of the releasing spring **36** may be effectuated by electromagnetic means rather than inductive means. For instance, an external transmitter of electromagnetic radiation may be arranged to expose the anti-theft device **10** to radiowaves or microwaves.

An alternative locking mechanism **40** is disclosed in FIG. **5**. The locking mechanism **40** comprises a thermally controllable element in the form of a shape-memory metal ring **42** as well as three securing beams **43**, which are mounted to the inner surface of the shape-memory metal ring **40** and extend perpendicularly from the circumference of the ring **40** towards the center point thereof. The respective second ends **43***b* of the securing beams **43** are concavely arc-shaped.

When the thermally controllable element **40** assumes its first or normal position, the second ends **43***b* of the securing beams **43** together form a circular opening **44**. As shown in FIG. **6**, the securing beams **43** are resiliently movable in one direction, namely towards the interior of the first housing element **12**, i.e. upwards in FIG. **6**. The pin **18** of the second housing element may thus be inserted between the three securing beams **43** into the first housing element **12**. However, the securing beams **43** may not be moved in the opposite direction past their normal horizontal position, as described in FIG. **6**. Thereby, once inserted into the opening **44**, the pin **18** is prevented from being removed in the opposite direction.

To unlock the anti-theft device an authorized person operates the inductive heating device described above.

When the alternating magnetic field is induced into the conductive shape-memory metal ring **40**, heat is generated therein. When the temperature of the shape-memory metal exceeds a predetermined limit, the diameter of the ring is increased at least 3–5%. As a consequence, the opening between the arc-shaped ends **43***b* of the securing beams **43** is enlarged, as indicated by a dashed circle **44'**. The pin **18** may freely be removed from the first housing element **12**, once the shape-memory metal ring **42** has entered its second position (which is indicated by a dashed circle **42'** in FIG. **5**).

According to another alternative embodiment of the present invention a separate induction receiver coil is connected in parallel to a releasing spring. The induction receiver coil is arranged to receive an alternating magnetic field generated by e.g. the external device described above, when operated by an authorized person, thereby generating an induced electric current, which is supplied through the releasing spring. As a consequence the releasing spring is heated, and when the temperature thereof exceeds a predetermined limit, the releasing spring switches to its second state, thereby assuming an extended position and releasing a male element.

As an alternative the thermally controllable element may be realized as a torsion helix, which is arranged to assume a first position during normal temperatures and a second position at temperatures exceeding a predetermined limit. In similarity to the above the torsion helix is arranged to engage and secure a pin of a second housing element, when the torsion helix assumes its first position, and to end the engagement of the pin, when the torsion helix assumes its second position.

As previously mentioned, an anti-theft device according to the present invention is preferably provided with theft-deterring means, for instance of any of the types described in section "Description of the Prior Art" above. Hence, the anti-theft device may comprise one or more than one fragile ampoules containing a discoloring and/or ill-smelling substance. Furthermore, the anti-theft device may be provided with a magnetic or electronic sensor or transponder, which may be detected by means of an electronic article surveillance system (EAS) known per se. Preferably, such a transponder comprises an amorphous magnetic element, the permeability of which is controllable by means of an externally generated magnetic field. Optionally, the amorphous magnetic element may be inductively coupled to an electronic resonance circuit, the resonance frequency of which depends on the permeability of the amorphous element.

The present invention has been described above with reference to a few embodiments for exemplifying but not limiting reasons. As will be readily understood by a man skilled in the art, the present invention may be realized in other ways than the ones described, and the scope of the present invention is only limited by the definitions in the appended independent patent claims. In particular it is to be noted that the thermally controllable element may be heated by other means than an inductive heating device. Furthermore, the female portion of the locking mechanism may employ other means than retaining balls, for instance teeth or hooks, and the male portion does not have to be essentially pin-shaped. In addition, the thermally controllable element may be made from other materials than metals exhibiting a SME effect. One such alternative material is a bimetal.

What is claimed is:

1. An anti-theft device for deterring theft of a protected article, the device comprising

a first housing element comprising a female portion;

a second housing element comprising a male portion;

a locking mechanism adapted for releasably securing the male portion of the second housing element to the female portion of the first housing element, the locking mechanism comprising

a thermally controllable element adapted to assume a first position at temperatures below a predetermined limit wherein the locking mechanism locks the male portion to the female portion, and a second position at temperatures above the predetermined limit wherein the locking mechanism releases the male portion from the female portion; and

heat generating means in thermal communication with the thermally controllable element, the heat generating means being adapted for receiving electromagnetic energy and generating heat therefrom so as to heat the thermally controllable element.

2. An anti-theft device according to claim **1**, wherein the thermally controllable element comprises a material exhibiting a shape-memory effect.

3. An anti-theft device according to claim **1**, wherein the thermally controllable element comprises bimetallic material.

4. An anti-theft device according to claim **1**, wherein the heat generating means are comprised by the thermally controllable element.

5. An anti-theft device according to claim **1**, wherein the heat generating means comprise an inductive coil connected in parallel to the thermally controllable element.

6. An anti-theft device according to claim **1**, wherein the thermally controllable element is adapted to be heated via induced magnetic energy.

7. An anti-theft device according to claim **1**, further comprising at least one enclosed space containing a marking fluid, and means for breaking the enclosed space in response to an unauthorized attempt to remove the male portion from the female portion.

8. An anti-theft device according to claim **7**, wherein the marking fluid is a discoloring fluid.

9. An anti-theft device according to claim **7**, wherein the marking fluid is an ill-smelling fluid.

10. An anti-theft device according to claim **1**, further comprising means for generating a signal representative of an alarm condition in response to the reception of an interrogation signal.

11. An anti-theft device according to claim **10**, wherein said means for generating a signal representative of an alarm condition comprises an amorphous magnetic element.

12. An anti-theft device according to claim **10**, wherein said means for generating a signal representative of an alarm condition comprises an electronic resonance circuit.

13. An anti-theft device according to claim **1**, wherein the predetermined limit is greater than 100 degrees Celsius.

14. An anti-theft device according to claim **1**, wherein the thermally controllable element comprises a nonmagnetic material.

15. An anti-theft device according to claim **1**, wherein the thermally controllable element comprises a nickel-titanium alloy.

16. An anti-theft device according to claim **1**, wherein the thermally controllable element is adapted to be heated via microwaves.

17. An anti-theft device according to claim **1**, wherein the thermally controllable element is adapted to be heated via radio waves.

18. An anti-theft device according to claim **1**, wherein the heat generating means is adapted for receiving electro-

magnetic energy and converting the electro-magnetic energy to electricity, and for generating heat from the electricity.

19. An anti-theft device for deterring theft of a protected article, the device comprising

a first housing element comprising a female portion;

a second housing element comprising a male portion;

a locking mechanism adapted for releasably securing the male portion of the second housing element to the female portion of the first housing element, the locking mechanism comprising

a thermally controllable element adapted to assume a first position at temperatures below a predetermined limit wherein the locking mechanism locks the male portion to the female portion, and a second position at temperatures above the predetermined limit wherein the locking mechanism releases the male portion from the female portion;

heat generating means in thermal communication with the thermally controllable element, the heat generating means being adapted for receiving electro-magnetic energy and generating heat therefrom so as to heat the thermally controllable element;

wherein

the first housing element comprises a spring biased insert and at least two retaining balls contained therein;

the female portion is in the form of a bore adapted for receiving the male portion of the second housing element;

the device comprises a spring coil adapted for biasing the spring biased insert, such that the retaining balls are urged into frictional engagement with the male portion, thereby securing the male portion within the female portion;

the thermally controllable element is arranged with respect to the biasing spring coil such that the thermally controllable element is adapted to counteract a biasing force of the biasing spring coil so as to release the frictional engagement between the retaining balls and the male portion when the thermally controllable element is heated to a temperature above the predetermined limit; and

the thermally controllable element is adapted to be heated via induced magnetic energy.

* * * * *